TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. ITL.0536US

In Re Application Of: **Dean Rosales**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/821,563	March 29, 2001	Wesley J. Tucker	21906	2623	5880

Invention: **Providing Multiple Symmetrical Filters**

SEP 2 9 2004

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on **August 26, 2004**

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Signature

Dated: **September 27, 2004**

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In re Applicant:		§		
	Dean Rosales	§	Art Unit:	2623
		§		
Serial No.:	09/821,563	§	Examiner:	Wesley J. Tucker
		§		
Filed:	March 29, 2001	§	Conf. No.:	5880
		§		
For:	Providing Multiple	§	Atty Docket:	ITL.0536US
	Symmetrical Filters	§		(P10841)

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APPEAL BRIEF

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Cynthia L. Hayden

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REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1-25 are rejected. Each rejection is appealed.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

Spatial convolution calculates what is going on with the pixel brightness around a particular processed pixel. See specification, page 2, lines 2-4.

A spatial convolution may use a mathematical construction of an input pixel and its neighbors to determine an output pixel brightness value. A kernel is a group of pixels used to determine a mathematical calculation of output pixel brightness values. See specification, page 2, lines 15-19. Thus, a convolution may be applied to a kernel to implement a filter. As explained on page 3 of the specification, a kernel convolution may involve a center pixel and, in a 3x3 example, its eight neighbors. The center pixel and its eight neighbors are multiplied by their respective convolution coefficients and the multiplicands may be summed.

As explained at lines 23 and 24 of page 3, conventional convolution masks generally only determine a single kernel size. In some cases, a plurality of different kernels may be needed.

The technique for simultaneously calculating kernels is explained beginning at page 4, line 24. An nxn kernel may be folded along the row and column directions to produce a compacted kernel. This compacted kernel may than be subjected to additions and multiplications in accordance with a spatial filtering algorithm in a way that enables outputs of a variety of different kernel sizes. Thus, a plurality of filters of different sizes may be determined from the same image data.

Referring to Figure 1, the technique for simultaneously calculating the filters is explained at page 7, line 21. Symmetry in the data shown in Figure 2 may be exploited to pre-add pixel data that will be multiplied by the same convolution coefficient. For example, because of symmetry, the diagonals may use the same convolution mask coefficients in one embodiment. Thus, the symmetry may be used to reduce the number of rows of data. In the example shown in the Figure 3, row 11 is added to row 1, row 10 is added to row 2, row 9 is added to row 3, and so on. As a result, the 11x11 matrix of data ends up as a 6x11 kernel.

Referring to Figures 4 and 5, the columns may be pre-added together to reduce the number of columns. Again, reduction is possible because of the inherent symmetry of the matrix. Thus, column 11 may be added to column 1, column 10 may be added to column 2, and so on. As a result of the row rise and column rise folding, a 6x6 matrix may be stored in the hardware 16 shown in Figure 5.

Referring to Figure 6, the filter values for a plurality of different filter kernel or matrix sizes are then calculated. In one embodiment, the filters may be calculated in order from the smaller to the larger kernel size. Thus, in the illustrated embodiment, the 6x6 pre-added data storage 26, shown in Figure 6, calculates the 3x3 matrix using row 5, columns 5 and 6 and row 6, columns 5 and 6 and then progressing as illustrated in Figure 6 through the 5x5, 7x7, 9x9, and 11x11 matrixes.

To calculate a given filter, some values in a given diagonal may be added together and accumulated in the adder or accumulator section 28. These results may then be saved for use in filter calculations for the larger kernels.

The calculation of the 3x3 filter utilizes the data in the box labeled 3x3 in storage 26. The pre-added data value sitting in row 6, column 6, is directed by the state machine 11 to the register 36k in section 28.

The pre-added data in diagonal 10 may use one of the AAC section 28 adders 34 and the result is stored in register 36j. In particular, the state machine 11 causes a specified adder, such as the adder 34e, to add the values in diagonal 10 (row 6, column 5 and row 5, column 6) and to place the result in the register 36j, for example. The data value in row 5, column 6, that belongs to diagonal 9 is moved directly to the accumulator storage area 36i, again, because no adding is necessary.

Three multipliers, such as the multipliers 38c, 38d, and 38e, multiply the three data values in the registers 36i-36k with the respective convolution coefficients from the coefficient bank 48. The multiplication results are then added by the adder 42b and that result is added in the adder 36 to the result of the multiplier 38c.

The 5x5 filter, shown in the lower left-hand corner of Figure 6, may be calculated starting at the lower right-hand corner of the data storage 26 and moving up. The data value on the diagonals 11 and 10 are already sitting in their respective accumulators ready for multiplication due to the prior calculation of the 3x3 filter. This is an example of how two filters can be calculated simultaneously. It is evident that the processes used to calculate the 3x3 filter also help to calculate the 5x5 filter.

The values for diagonal 9 need to be added together. One of the data points, row 5, column 5, is sitting in the accumulator section 28. The remaining two rows, in row 4, column 6,

and row 6, column 4, need to be accumulated. One of the accumulator section adders may be utilized for this function and the result may be stored in the register 36i.

There are two values for diagonal 8 (row 4, column 5, and row 5, column 4) that are added together and stored in the register 36h. One of the adder accumulator section adders is used to accomplish this task with the result saved in register 36h.

The value for diagonal 7 (row 4, column 4) may be moved into register 36g. The multiplied accumulate section 30 performs the final multiplication step. The values in the registers 36g-36k are multiplied by the corresponding coefficients.

The remaining filters may be calculated the same way. The multiply accumulate section 30 may be used to calculate portions of the filter and subsequently to calculate the remaining data points.

Because many of the steps are done in parallel, the overall number of clock cycles are reduced. The calculations may be pipelined in some embodiments and many steps may be accomplished in one clock cycle.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Is the Disclosure Enabling of Claims 1, 9, 11, and 39?

B. Are Claims 1, 4, 8-11, and 18-20 Anticipated by Park?

ARGUMENT

A. Is the Disclosure Enabling of Claims 1, 9, 11, and 39?

Claim 1 calls for receiving image data and "simultaneously" determining at least two filters of different sizes from the data. In the Advisory Action, the Examiner states that he "agrees that the values calculated for the 3x3 filter are available in use for the 5x5 filter calculation." But the Examiner insists that the claim requires that the 5x5 filter be calculated entirely simultaneously with the 3x3 filer. Such an interpretation is wrong as a matter of law because it reads the word "entirely" into claim 1 before "simultaneously."

In other words, the Examiner agrees that at least a portion of the 3x3 and 5x5 filters are calculated at the same time. But he insists that to meet the claim limitations, they must all be calculated at the same time. However, this position is completely inconsistent with the claim language that says simply "simultaneously" determining at least two filters. Those filters are simultaneously calculated in part; just all of the filter values are not simultaneously calculated.

In paragraph 4 of the final rejection, it is indicated that the 5x5 filter is calculated using information obtained due to the prior calculation of the 3x3 filter. The Examiner then concludes that "therefore, the calculation of the 5x5 filter must take place some moment after the 3x3 filter calculation because the 3x3 calculation is referred to as prior. The Examiner contends that this is in direct contradiction of the conventional definition of simultaneous, which is taken to mean occurring at the same time.

But the calculation of the 5x5 filter does take place at the same time as the calculation of the 3x3 filter because the calculation of the 3x3 filter is part of the calculation of the 5x5 filter. Therefore, the 3x3 and 5x5, by the Examiner's own definition, are necessarily undertaken simultaneously.

B. Are Claims 1, 4, 8-11, and 18-20 Anticipated by Park?

As best it can be understood, it is argued that Park inherently does what is claimed. But there is no reason that Park inherently calculates the filters in the fashion claimed, namely simultaneously. See M.P.E.P. § 2112 (the allegedly inherent characteristic must necessarily flow from the teachings of the prior art). He could do them totally separately and serially. There is no reason to presume that he overlapped the calculations in the way claimed. Therefore, Park's

teaching cannot meet the claims inherently since there is nothing whatsoever in Park that suggests that the filters are calculated simultaneously, and there is no reason why this must necessarily be so.

Applicant respectfully requests that each of the final rejections be reversed and that the claims subject to this Appeal be allowed to issue.

Respectfully submitted,

Date: September 27, 2004

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CLAIMS APPENDIX

The claims on appeal are:

1. The method comprising:
receiving image data; and
simultaneously determining at least two filters of different sizes from said data.

2. The method of claim 1 wherein receiving data includes receiving a matrix of data having rows and columns, and reducing the number of rows and reducing the number of columns.

3. The method of claim 2 including adding rows together and adding columns together.

4. The method of claim 1 including progressively calculating filters from smaller to larger sizes.

5. The method of claim 4 including receiving image data values, adding the values together, and multiplying the values by convolution coefficients.

6. The method of claim 5 including reusing the results of said additions and multiplications calculated for one filter size, when calculating a filter of a larger size.

7. The method of claim 1 including receiving data values in rows and columns, and adding together data values along diagonals.

8. The method of claim 1 including calculating at least two filters for a first pixel among said image data and then calculating a filter for an adjacent pixel.

9. The method of claim 1 including simultaneously generating at least three filters of different sizes.

10. The method of claim 1 including successively calculating filters of prograessivley larger size.

11. An article comprising a medium storing instructions that enable a processor-based system to:

receive image data; and

simultaneously determine at least two filters of different sizes from said data.

12. The article of claim 11 further storing instructions that enable the processor-based system to reduce the number of rows of image data and reduce the number of columns of image data.

13. The article of claim 12 further storing instructions that enable the processor-based system to ad values associated with rows together errand to add values associated with columns together.

14. The article of claim 11further storing instructions that enable the processor-based system to progressively calculate filters from smaller to larger size.

15. The article of claim 14 further storing instructions that enable the processor-based system to receive image data values, add the values together, and multiply the values by convolution coefficients.

16. The article of claim 15 further storing instructions enable the processor-based system to reuse the results of said additions and multiplications calculated for one filter size, when calculating a filter of a larger size.

17. The article of claim 11 further storing instructions that enable the processor-based system to receive data values in rows and columns, and add together data values along diagonals.

18. The article of claim 11 further storing instructions that enable the processor-based system to calculate at least two filters for a first pixel among said image data and then calculate a filter for an adjacent pixel.

19. The article of claim 11 further storing instructions that enable the processor-based system to simultaneously generate at least three filters of different sizes.

20. The article of claim 11 further storing instructions that enable the processor-based system to successively calculate filters of progressively larger size.

21. The system comprising:

a first set of adders to add together rows and to add together columns of image data; and

a second set of adders and a first set of adders and a fist set of multiplies to calculate at least two different filter sizes from said image data.

22. The system of claim 21 that progressively calculates filters from smaller to larger sizes.

23. The system of claim 22 that utilizes the results from said second set of adders and first set of multipliers for one filter size, when calculating a filter of a larger size.

24. The system of claim 21 including a state machine that control the operation of said first and second adders and said first set of multipliers.

25. The system of claim 21 wherein said second set of adders adds image data along diagonals.